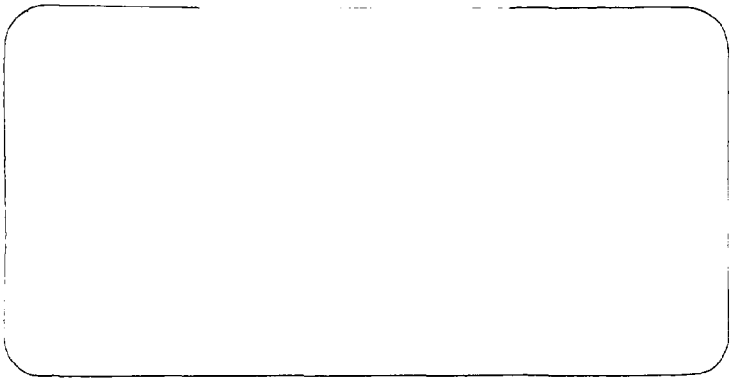
South Carolina. Coastal Zone Management Program



COASTAL ZONE

INFORMATION CENTER

ENGINEERING REPORT

CAROLINA REFINING AND DISTRIBUTING COMPANY

PROPOSED 30,000 B/D FUELS SEPERATION UNIT

SAMPIT RIVER AREA - GEORGETOWN COUNTY, S. C.

VOLUME I - AIR PERMITS

ENGINEERING REPORT

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SAMPIT RIVER AREA - GEORGETOWN COUNTY, S. C.

JOB NUMBER 2761

JUNE 1978

PREPARED BY

DAVIS & FLOYD ENGINEERS, INC.

CONSULTING ENGINEERS

GREENWOOD, SOUTH CAROLINA

ENGINEERS' CERTIFICATE

We, the undersigned Engineers, have prepared the attached Engineering Report and hereby certify that all data and estimates contained herein are true and correct to the best of our knowledge and belief.

DAVIS & FLOYD ENGINEERS, INC.
CONSULTING ENGINEERS
GREENWOOD, SOUTH CAROLINA

R. L. (Rudy) Powell
State of South Carolina License No. 7029

INTRODUCTION

This Engineering Report is prepared for presenting background information for a proposed Carolina Refining and Distributing Company, Fuels Seperations Unit. This plant will be located in the Sampit River area of Georgetown County as shown on Figure 1a (Harmany site and alternate Myrtle Grove site). The major portion of the feed stock for the plant will be transported to site via sea transport. The feed stock will be processed into medium and light fuels and coke. The products will be distributed by sea transport, barge or truck throughout the Carolinas and Virginia.

A general description of the project for the topping operation proposed for Georgetown County site is as follows:

The expanded topping operation proposed for the site in a category under the General SIC Code 2900. The proposed topping operation will not be of conventional design but will utilize the most recent state-of-the-art processes. The energy required is minimal and as a result the potential for air, water, and solid waste generation is greatly reduced in comparison to similar conventional refining operations.

The operation as proposed utilizes a partially refined or crude feed stock of either foreign or domestic orgin. The products, saleable and/or disposable as are produced and wastes generated are as follows:

1. Lead free gasoline.
2. Jet fuel, Diesel fuel.
3. Fuel gas (utilized as an energy source within the plant itself).

4. Coke. Made from residuals and sold as a high purity carbon.

5. Elemental Sulfur. By-product of the removal of sulfur compounds from the feed stock and/or fuel gas. The recovered sulfur will be sold for uses in heavy chemical manufacture in the Carolinas and Virginia areas.

6. Combustion Products. The fuel gas utilized in the heat producing processes of the plant will be virtually sulfur free. There will be a minimum of particulates and oxides of nitrogen generated and discharged to the atmosphere.

7. Volatile Organics Emission. The storage tank vents, process vents, and all other actual or potential sources of organic emissions will be tied to a header system. This system will in turn feed back into the process and/or process heating system. There should, therefore, be virtually zero discharge of volatile organics from the system. In the unlikely event that a process upset occurs or an emergency situation arises, the header will be relieved to a flare and the organics will be incinerated rather than released to the atmosphere. This type excursion should occur rarely, if at all.

8. Solids. There will be virtually no waste solids generated in the proposed topping operation other than a small amount of platinum catalyst. This will be economic necessity to be kept to an absolute minimum. It is proposed that a small controlled industrial solid waste landfill be developed on the site for the disposal of this solid waste. Wastewater treatment plant sludge will be generated on the site and it will be disposed of in a county sanitary landfill under separate permits and contracts.

9. Wastewater. Wastewater generated on the site will be treated to the degree required by State and Federal Law and discharged to the recovery stream after the necessary permits have been obtained. Wastewater in this instance includes in a broad sense storm water runoff, process wastewater, and sanitary wastewater.

FACILITY DESCRIPTION

The overall facility as proposed for the site consists of the following:

1. Sea Transport and Barge Docking Facility

   The pier located near the site in Georgetown County will be utilized for off loading/loading of feed stock and finished products (Figure 1, (1)). The port of Georgetown and the general area of the site are presently used for oil and/or petrochemical processing and/or transportation

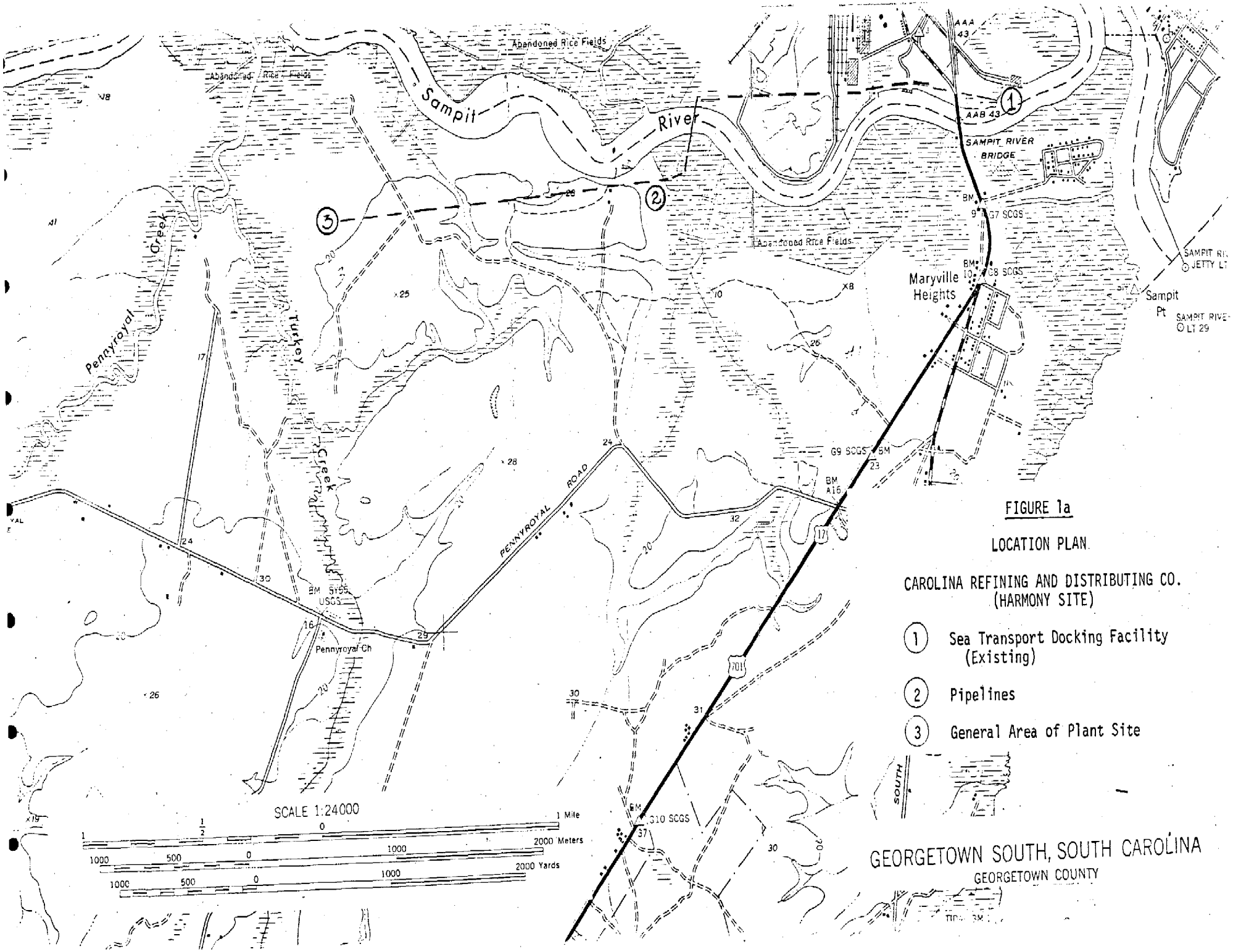

FIGURE 1a

LOCATION PLAN

CAROLINA REFINING AND DISTRIBUTING CO.
(HARMONY SITE)

1. Sea Transport Docking Facility (Existing)
2. Pipelines
3. General Area of Plant Site

GEORGETOWN SOUTH, SOUTH CAROLINA
GEORGETOWN COUNTY

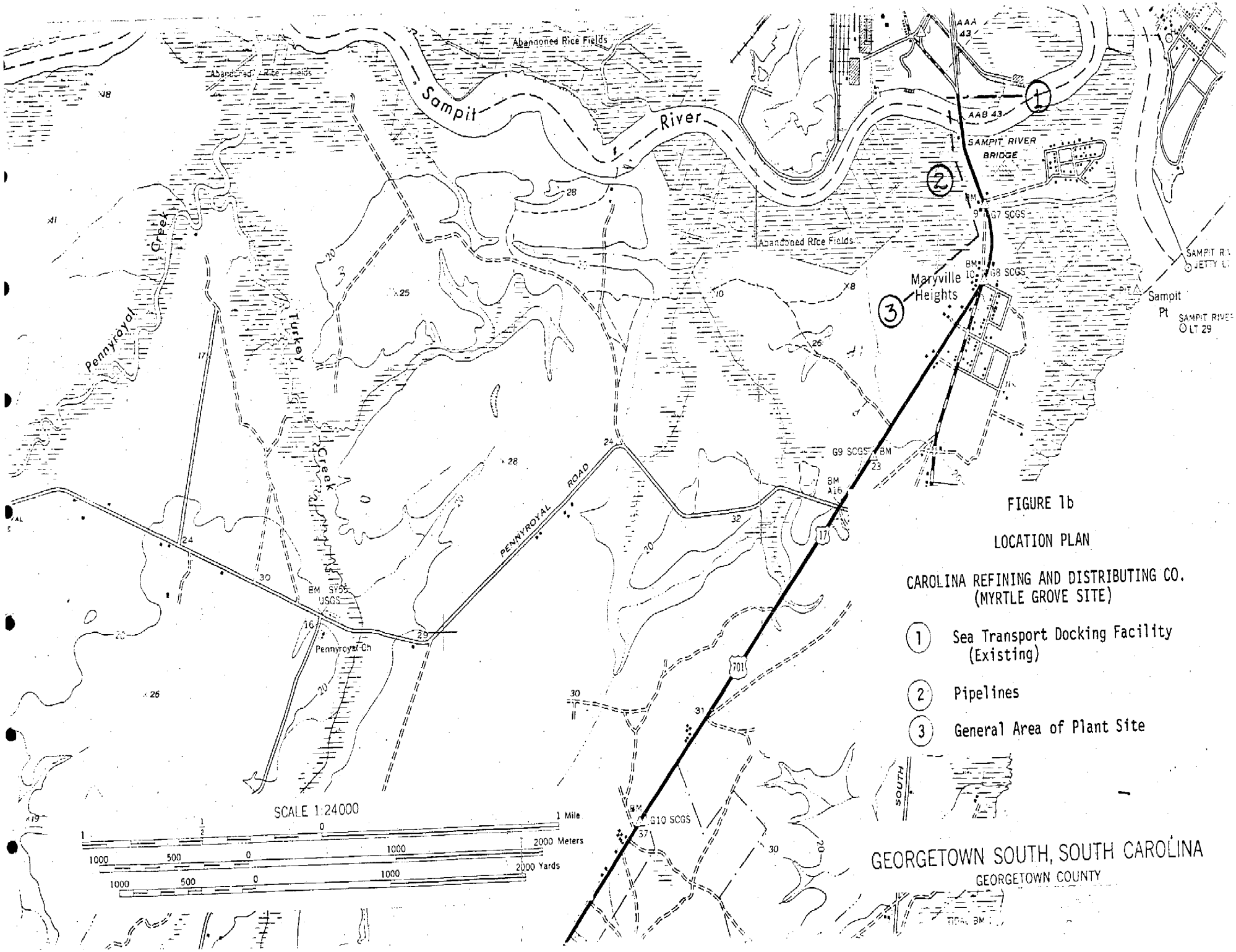

FIGURE 1b

LOCATION PLAN

CAROLINA REFINING AND DISTRIBUTING CO.
(MYRTLE GROVE SITE)

1. Sea Transport Docking Facility (Existing)
2. Pipelines
3. General Area of Plant Site

GEORGETOWN SOUTH, SOUTH CAROLINA

GEORGETOWN COUNTY

The presence of an additional tanker once a week and additional barge traffic will not be an unusual or significantly different evolution.

2. Pipeline.

The pipelines proposed for the off loading of crude and the loading of finished product will be placed generally as shown on Figure 1.

3. Plant Site.

The plant sites are located on high ground in areas shown on Figure 1. The site is some 100 acres in size. The initial clearing and grubbing of the site will be conducted under erosion prevention and control practices. The site is located as shown on Figure 1, (3).

PROPOSED 30,000 B/D PLANT PRODUCT MIX

	Product	B/D	%*
1.	Gasoline	11,255	37.5
2.	Middle Distillutes	17,207	57.3
3.	Residual Fuels*	0	0
4.	Other Products*	-	-

Other products represent elemental sulfur and coke.

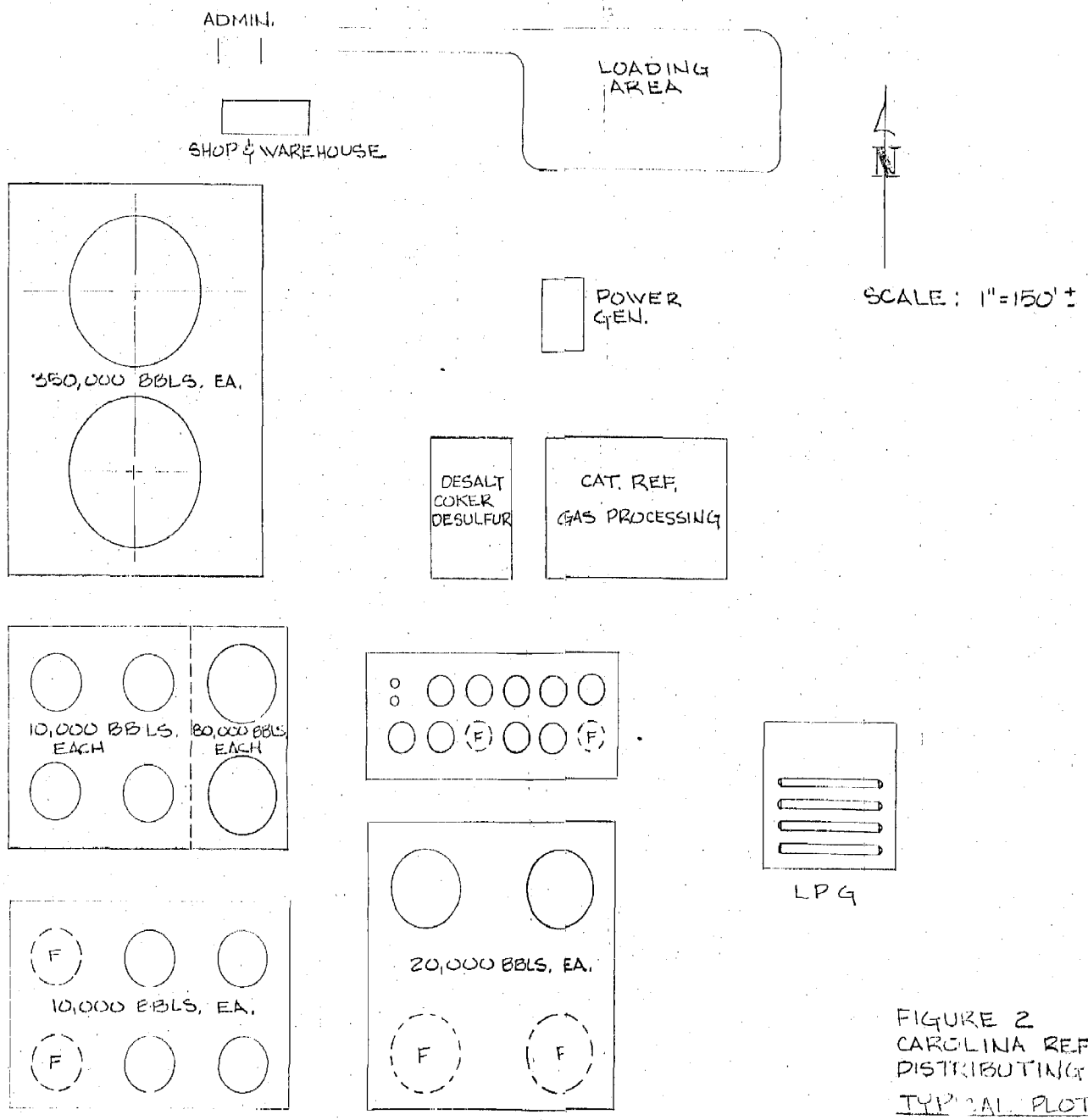

FIGURE 2
CAROLINA REFINING & DISTRIBUTING COMPANY
TYPICAL PLOT PLAN

Detailed Description of Proposed Fuel Seperation Unit

The crude will be received by sea transport at the pier. It will then be pumped to the topping facility via a pipeline. The crude will be separated into gasoline, jet fuel, and diesel fuel. The residuals will be coked resulting in additional fuels and high grade industrial carbon. The sulfur compounds will be removed by conversion into elemental sulfur. The schematics of the general process and specific unit process which follow:

1. Tankage

	Number	Size, Bbl.	Capacity
Crude Oil	2	350,000	700,000
Gasoline	2	10,000	20,000
Gasoline	2	80,000	160,000
Kerosene-Jet	2	10,000	20,000
Kerosene-Jet	2	80,000	110,000
No. 2	2	10,000	20,000
Propane	4	500	2,000
Naptha-Reformer Chg.	1	20,000	20,000
Kerosene-Treater Chg.	1	20,000	20,000
Total			1,272,000

At the ship unloading and barge loading dock, ships and barges will be encircled with floating oil retainers so any possible spill can be completely recovered. Pans will be placed under all hose flanges to catch any possible drips.

2. Shipping

Crude receipts will be made by tanker with 40 ft. maximum draft unloading at 100,000 bbls./hr. into shore tanks using ship's pumps. Product shipment will be by barge (12' draft), rail, tank truck, pipeline, and tanker.

3. Auxiliaries

Auxiliaries include steam boilers and distribution system, electric power supply and distribution system, compressed air supply and distribution system, fire water supply and distribution system, inert gas supply and distribution system, remote tank gauging and controls, and telephone and radio communication systems.

4. General Areas and Facilities

Additional facilities include administrative offices, control laboratory, guardhouse, fire fighting equipment, shops, warehouse, effluent water treating facilities, roads, drainage, sewers, fences, and fresh water supply.

5. Refinery Design

The refinery is a 30,000 barrel-a-day plant capable of processing medium to low gravity high-sulfur oil with very high conversion to light products, i.e., up to 36% unleaded gasoline and 56% middle distillates.

6. Description of Unit Processes (Figure 3-Overall, Figures 4, 5, and 6 Detailed

A. Crude Oil Fractionation. Crude is fed into the crude oil fractionation unit (heating and flashing unit) where seperation is made into fuel gas and gaseous sulfur compounds, middle distillates including liquid fuels (gasoline) and naptha and a final bottom product.

B. Desulfurization. Fuel gas and gaseous sulfur compounds from the crude oil fractionation unit are fed into a Claus unit followed by a Stretford unit. In these units the sulfur compounds are converted into elemental sulfur. The desulfurized fuel gas produced in these units is routed to storage or to immediate use in the gas turbine generator.

C. Reformer. The reforming unit converts low antinock naptha from the crude oil fractionation unit into high antinock gasoline by use of platinum catalyst process.

D. Coker. The bottoms from the crude oil fractionation unit are subjected to a coking process. The residual or bottoms is converted into lighter products and a high grade coke residual. The lighter products are sent to the reformer for upgrading into fuels.

E. Hydrogen Production. Hydrogen is produced by the coking and reforming operations. The hydrogen is cryogenically purified then fed back to the reformer and other units where it is utilized in a catalytic reation which converts low grade fuels into high grade fuels and where sulfur compounds are converted to hydrogen sulfide.

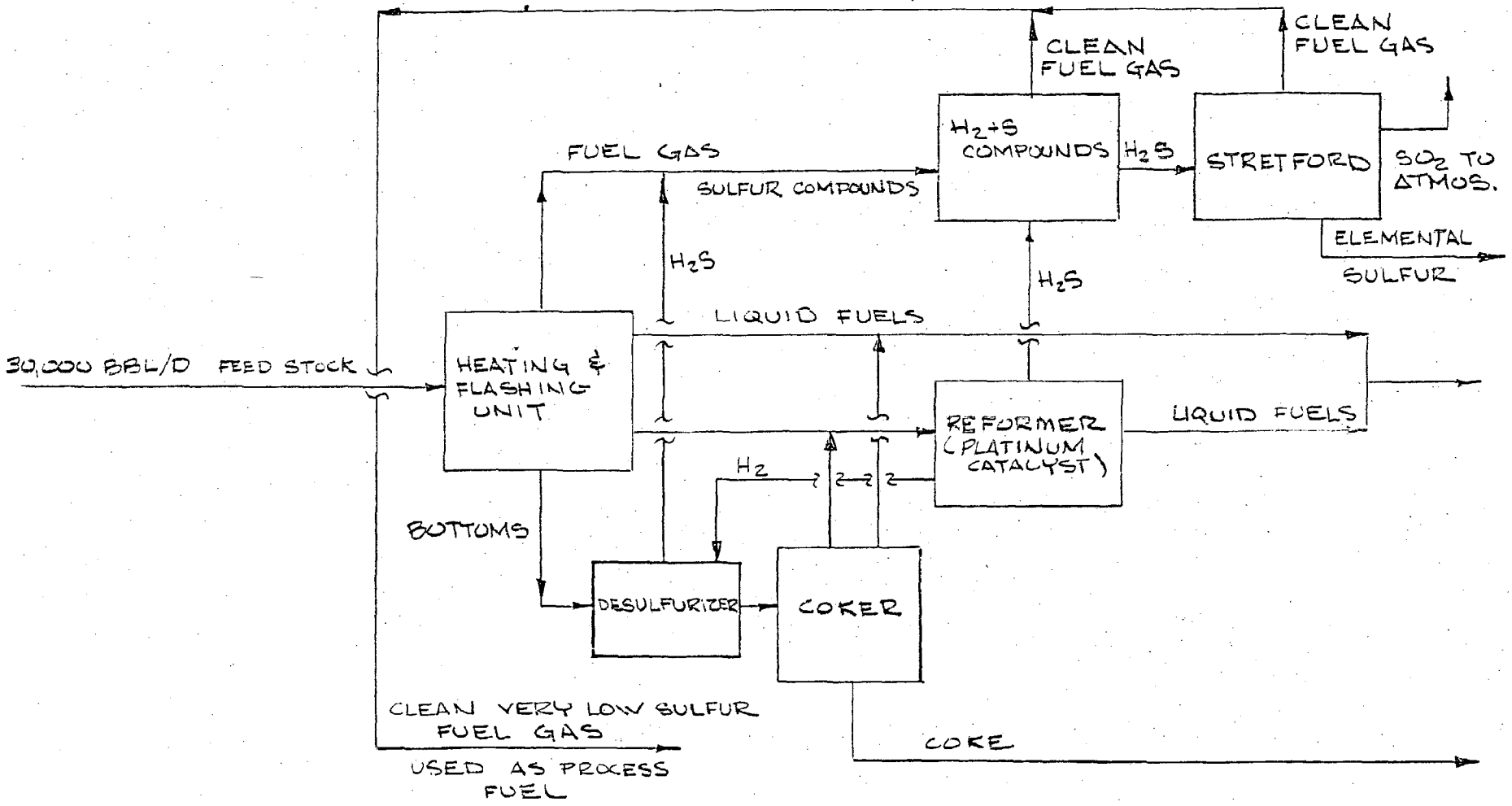

FIGURE 3
OVERALL PROCESS SCHEMATIC
(Simplified)

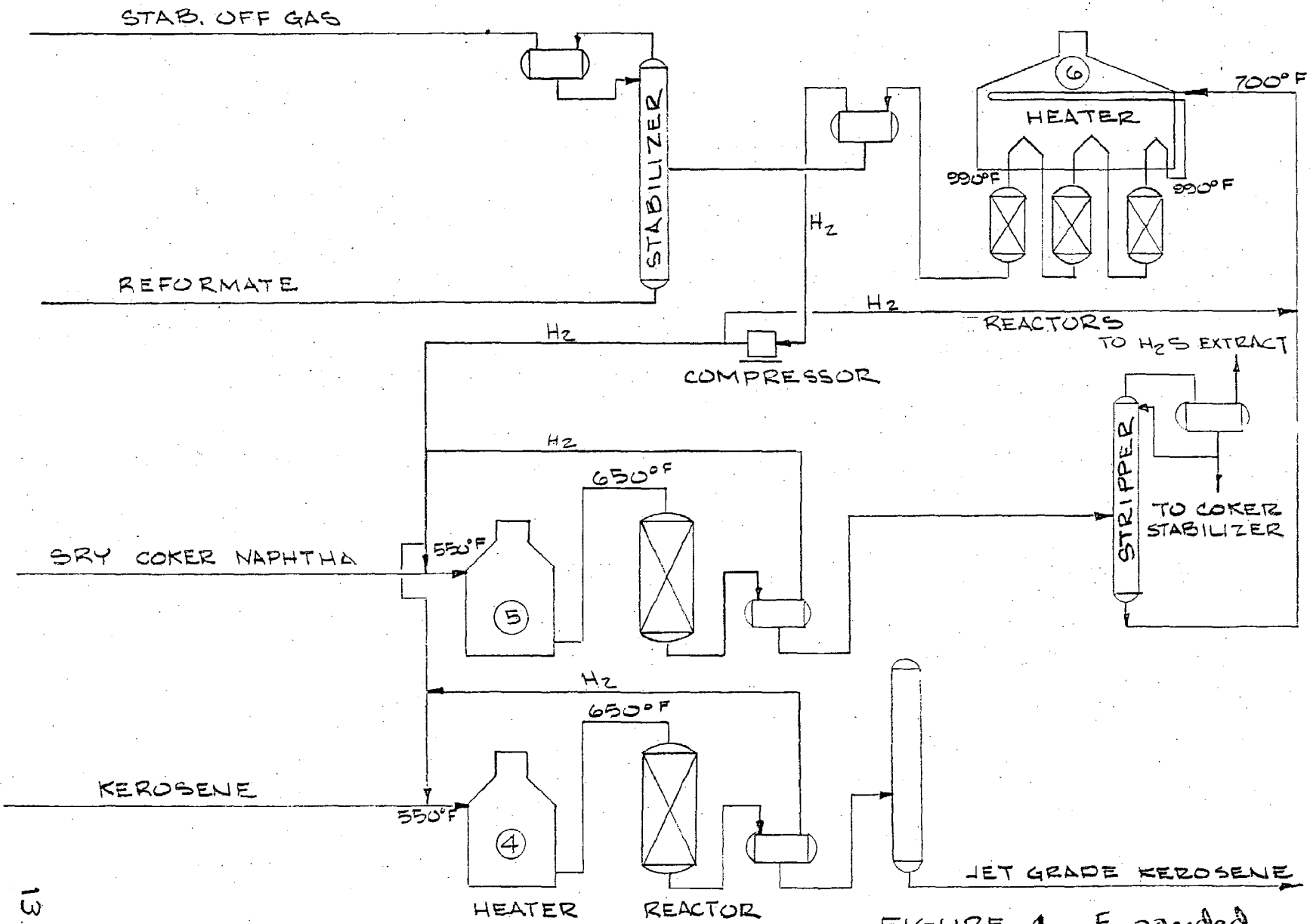

FIGURE 4 - Expanded SCHEMATIC FLOW DIAGRAM

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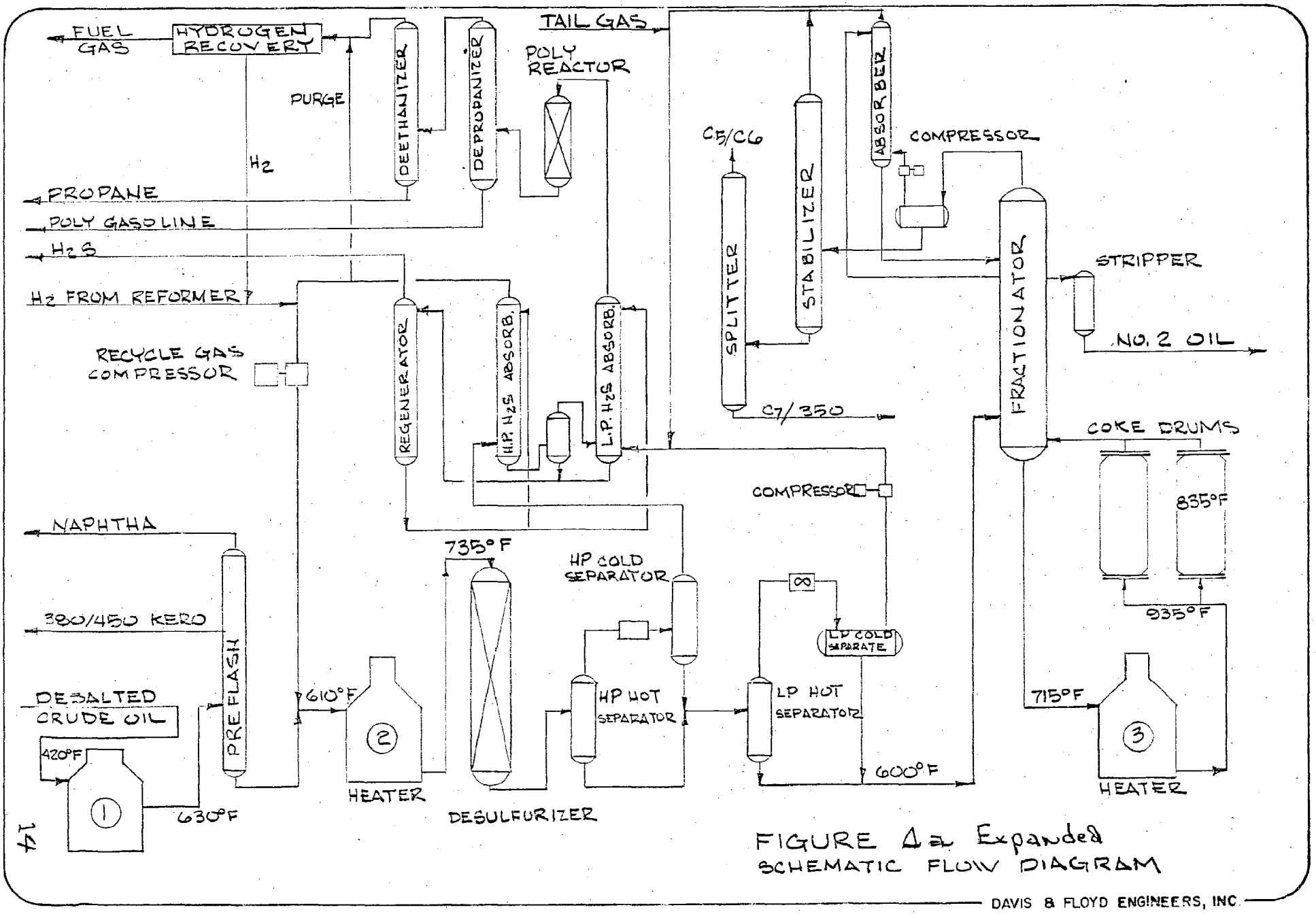
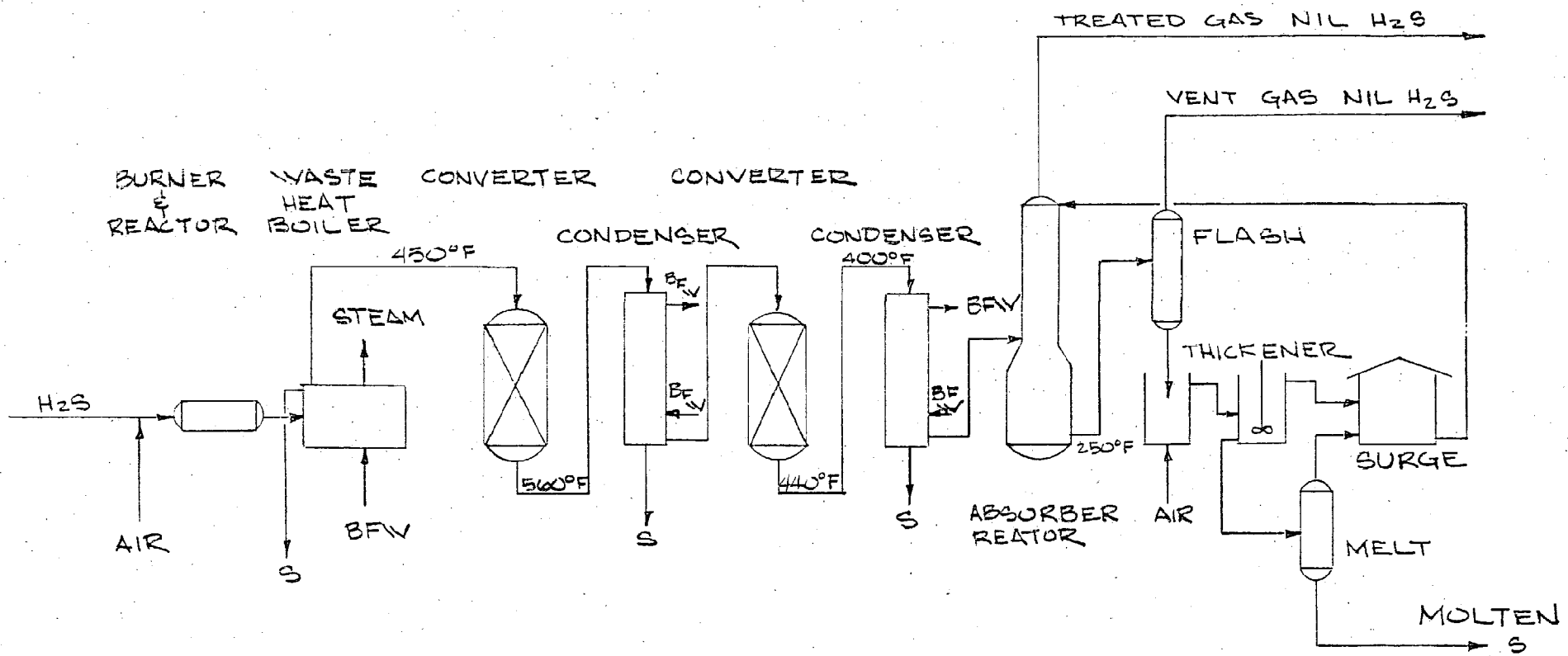


FIGURE 4a Expanded
SCHEMATIC FLOW DIAGRAM

SULFUR PLANT

CLAUS PROCESS

STRETFORD PROCESS



S= SULFUR
BFW = BOILER FEED WATER

FIGURE 5
SULFUR PLANT

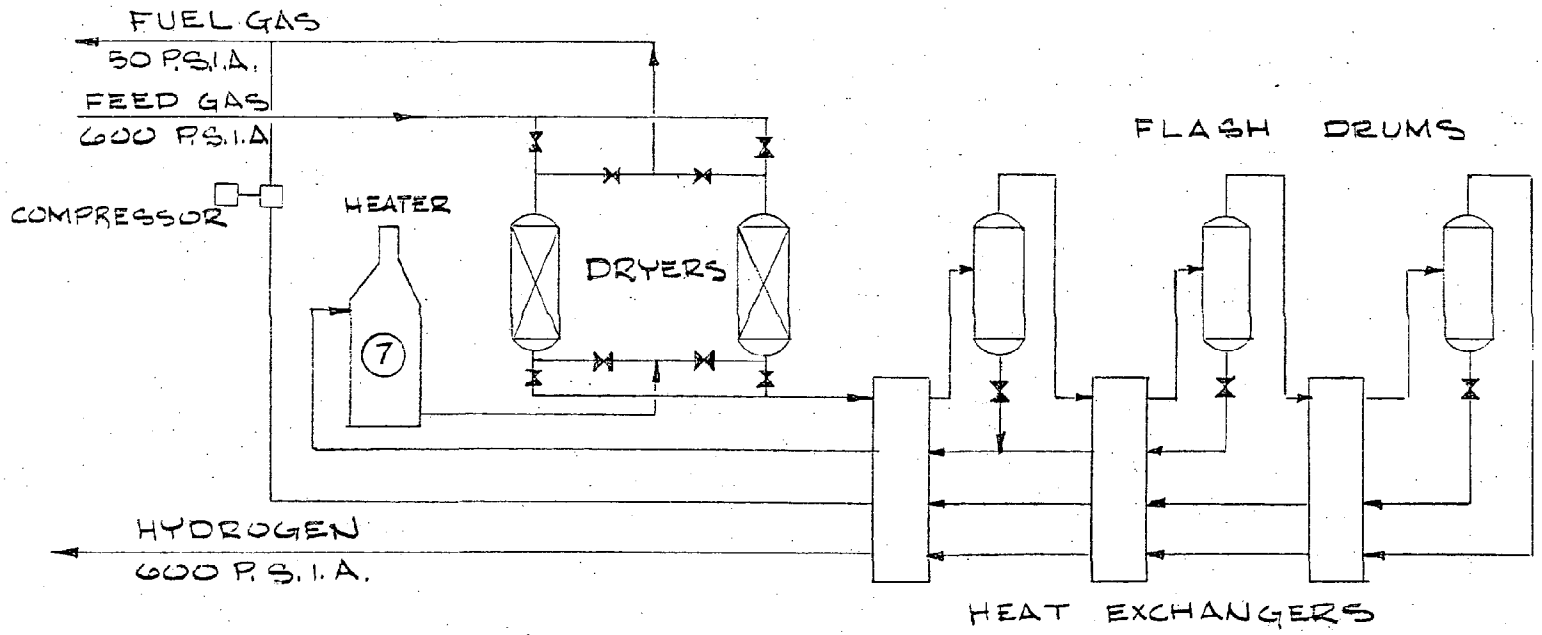


FIGURE 6
CRYOGENIC HYDROGEN PURIFICATION
SCHEMATIC FLOW DIAGRAM

ONSITE FUEL USEAGE AND DISCHARGES TO ATMOSPHERE

There will be on-site power generation sufficient to satisfy the demands of the proposed plant. Power will be generated by a gas turbine generator (GTG). The fuel for the gas turbine has its origin in the proposed plant. It appears as "fuel gas" on the several schematics presented elsewhere in this report.

The unit process heaters located at the various unit processes will utilize gas turbine generator exhaust as a primary heat source. In the event additional heat is required or additional control of heat is needed supplemental fuel gas will be supplied to the unit heaters.

The gas turbine generator exhaust has a temperature of 1050^{o}F when delivered to the unit process heaters. The unit process flue gas will be used to generate steam. The vent to the stacks has a temperature of 380^{o}F.

There are eight (8) unit process heaters located on the site as follows:

		Millons BTU/HR (LHV)
1.	Crude Heater	88
2.	Residual Desulfurization	67
3.	Delayed Coking	107
4.	Kerosene Treating	35
5.	Hydrogen Purification (Dryers)	5
6.	Naptha Treatment	30
7.	Naptha Reforming	87
8.	Boiler (Startup Only)	30

The fuel used in these unit process heaters is the desulfurized fuel gas generated in the process which has a sulfur content of 0.001% or less.

NOTE: Hydrocarbon vapors from process equipment, storage tanks, and bottom loading of trucks are collected in a closed pumping system and recovered or burned as fuel. In the unlikely event of system failure, the vapors will go to a smokeless flare. In no event will it be discharged directly to the atmosphere.

WATER USEAGE, WASTEWATER TREATMENT AND TREATED EFFLUENT DISCHARGE

The source of water for the proposed plant will be primarily from deep wells. A secondary source of water will be internal reuse of various plant process streams. There will also be reuse of the treatment plant effluent for selected plant processes. The sources of the wastewater are as follows:

1. Stormwater. Stormwater volume will vary with the intensity and duration of rainfall over the plant site. Stormwater will be collected separately and routed off the site generally using the natural flow patterns as they now exist. To insure that no surface contamination in the form of oils or grease will be discharged from the site the storm water will be routed through API separation before it leaves the site.
2. Cooling Water. Cooling water used on rotating machinery will be reused in selected plant processes or routed to the wastewater treatment plant for

appropriate treatment. It will then either be reused or discharged as treated effluent as determined by the demands of the plant.

3. Recirculating Cooling Water. Blowdown from the recirculating cooling water system will be pre-treated to remove heavy metals then routed to the treatment plant. It will be combined with other process water, treated then reused or discharged as treated effluent.

4. Process Water. Process water from the crude oil desalters, crude and product storage tanks and other similar units will be routed to the wastewater treatment plant via an API Seperator. There it will be treated and either reused or discharged as treated effluent.

5. Boiler Blowdown. Same as 4 above.

6. Sanitary waste. Blended with process waste at an appropriate place in the wastewater treatment process.

7. API Seperator Skimmings. Blended with crude and reprocessed.

It is estimated that there will be on the order of 1.0 MGD water supplied to the facility per day. There will be a discharge of 0.75 MGD treated effluent. There will be 0.5 MGD water reused and/or recycled within the facility.

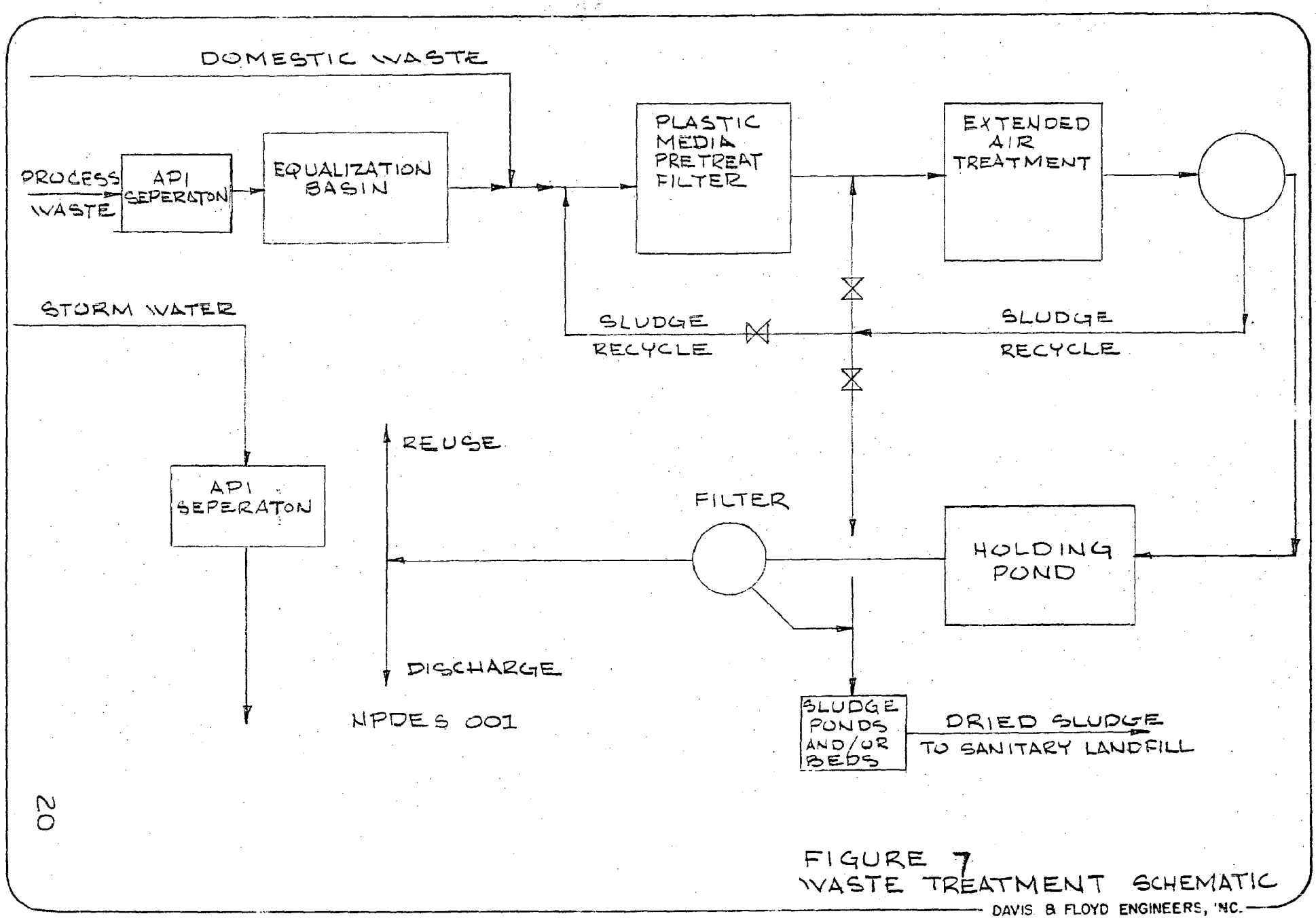


FIGURE 7
WASTE TREATMENT SCHEMATIC
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